REMARKS

Introduction

Claims 1, 2, 4, 6-13, 15, 16, 18, 20, 22 and 23 are pending. Claims 3, 5, 14, 17, 19 and 21 are canceled. Claims 1, 22 and 23 are amended.

Claim Amendments

Claim 1 is amended to change the previous recitation of "comprising" in the preamble to "consisting of," and is further amended to recite a magnesium percentage of 0.25-0.5. The amended magnesium range is derived from previous claim 5. Claim 1 is further amended to correct minor punctuation informalities.

Claims 22 and 23 have been amended to depend from claim 1 in light of the cancellation of previous base claim 21.

No new matter has been added to the claims.

Claim Rejections – 35 U.S.C. §103

SU '633

Claims 1, 2, 4-13 and 15-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over SU 348633 (SU '633). Applicant respectfully requests reconsideration and withdrawal of the rejection.

Claims 1, 5, 17, 19 and 21 are canceled.

Claim 1, as amended recites a an alloy with a composition *consisting of* (% by weight):

Si: 5 - 11
Fe at most 0.3
Mg: 0.25 - 0.5
Cu: 0.3 - 1.5
Ti: 0.05 – 0.25
Zr: 0.05 – 0.25
Mn <0.4

Zn <0.3
Ni <0.4
other elements <.10 each and 0.30 total, remainder aluminum.

Therefore, the composition is limited to only the elements recited in the claim.

As Applicant stated in the response filed February 26, 2008, the magnesium content in SU'633 is higher than the presently claimed magnesium content (0.25-0.5%). The magnesium content disclosed in SU '633 is not acceptable for application in diesel cylinder heads, as such a level of Mg content does not provide acceptable high temperature creep behavior and sufficient ductility, which are primary objects of the claimed invention.

Additionally, the SU'633 alloy contains boron, beryllium, and 0.1 – 0.2% mischmetal. The alloy recited in claim 1 does not contain these elements, and the levels of these elements disclosed in SU '633 are explicitly excluded by the recitation of the phrase "consisting of" in the preamble of claim 1. As stated in the previous response, the abstract attached to the previous response illustrates the effect of the addition of lanthan based rare earths (Figs. 16 and 17) on hardness (higher curve), elongation (medium curve) and tensile strength (lower curve). The comment on page 22 of the abstract states that, for PMGC cast parts, the addition of 0.2 to 0.75 % rare earth leads to a simultaneous increase in tensile strength and elongation, and the same conclusion applies to Fig. 17 (with the addition of 0.2 to 0.5 % rare earth). However, in all classical metallurgical systems such as that of the claimed invention, an increase in strength via Cu or Mg addition is systematically linked to a decrease in elongation. Thus, metallurgical systems with and without rare earth metals are clearly different and incomparable, and it follows that one of ordinary skill in the art would not even consider an alloy with rare earth metals to arrive at the claimed invention. Clearly, the addition of mischmetal would affect the basic and novel properties of the claimed alloys by affecting hardness and tensile strength, which are critical characteristics for good high temperature creep behavior and sufficiently high ductility. High temperature creep behavior and sufficiently high ductility are two of the most critical properties for highly stressed

cylinder heads, such as cylinder heads for diesel engines, and mainly in the intervalve area.

Still further, SU '633 discloses 0.1 – 0.3% vanadium, and also includes titanium and zirconium. SU'633 therefore discloses alloys requiring the simultaneous addition of titanium, zirconium and vanadium to improve their creep resistance at high temperatures. Applicant notes that the recited range of vanadium disclosed in SU '633 is now expressly excluded from claim 1 due to the recitation of an alloy "consisting of" less than 0.1% "other elements." As Applicant has previously argued, it is both difficult and unexpected to achieve satisfactory creep resistance at hot temperatures without harming ductility. In contrast to the alloys described in SU'633, the alloy recited in claim 1 achieves surprising and unexpected improvements in hot creep resistance over the base AlSiCuMg-type alloy, while retaining high ductility both at room and at elevated temperatures, without the addition of vanadium and with a completely new and dramatic effect on the behavior of stressed cylinder heads.

In summary, SU '633 does not teach or suggest that the hot creep resistance may be improved while maintaining ductility without the addition of vanadium to the AlSiCuMg type alloy of claim 1, and the SU '633 alloys containing mischmetal would provide substantially different properties. Furthermore, the alloy recited in claim 1 is shown to produce both an unexpected and improved hot creep resistance in comparison to what would have been expected for an AlSiCuMg-type alloy containing an addition of zirconium without a simultaneous addition of titanium and vanadium. Finally, retaining high ductility in a AlSiCuMg type alloy upon the conscious addition of zirconium is unexpected to one of ordinary skill in the art. For at least these reasons, claim 1 is allowable over SU '633. Claims 2, 4, 6-13, 15, 16, 18, 20, 22 and 23 depend from claim 1, and therefore are also allowable.

Dulin

Claims 1, 2, 4-13 and 15-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over US 2,821,495 (Dulin). Applicant respectfully requests reconsideration and withdrawal of the rejection.

Claims 1, 5, 17, 19 and 21 are canceled.

Applicant again emphasizes that the Dulin disclosure is limited to alloys for high strength structural castings, in particular body structure parts of a vehicle. The single example in Dulin concerns a part cast with an AlSi7Mg alloy (AA356) brazed with another cast part and with a wrought product. Such body structure parts are not comparable to an engine part with high hot creep resistance, as claimed, such as that required for cylinder heads, engine blocks and crankcases (see claim 13). In fact, in 1958, when the Dulin patent issued, the problem of improving the hot creep resistance of highly stressed automotive cylinder heads or crankcases did not exist. Thus, the problem addressed by the Dulin disclosure is not reasonably relevant to the problem addressed by the claimed invention.

Furthermore, Dulin discloses how to obtain hard and resistant structural cast components, and clearly requires these specific characteristics. In addition to titanium, Dulin strongly suggests adding zirconium, manganese, nickel, chromium, boron and beryllium, all of which are presented as hardening or refining elements. Contrary to the primary aspect of the claimed alloy, Dulin does not teach or even suggest coupling zirconium alone with copper and magnesium. Dulin therefore clearly teaches away from the claimed invention. Furthermore, the very broad ranges disclosed by Dulin do not teach or suggest the inventive selection of materials and ranges set forth in claim 1.

In conclusion, Dulin fails to teach or suggest that hot creep resistance may be improved by the claimed narrow inventive selection of materials and ranges, and concerns a very different type of application than the claimed alloy. For at least these reasons, claim 1 is allowable over Dulin. Claims 2, 4, 6-13, 15, 16, 18, 20, 22 and 23 depend from claim 1, and therefore are also allowable.

CONCLUSION

In view of the above amendment and foregoing remarks, applicant believes the pending application is in condition for allowance. If a fee is due, please charge our Deposit Account No. 09-0528, under Order No. A242 1090US, from which the undersigned is authorized to draw.

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Respectfully submitted,

By _____

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